MOBILE STATION AND METHOD FOR ALLOCATING FINGER THEREOF IN CDMA COMMUNICATION SYSTEM

FIELD OF THE INVENTION

The present invention relates to a mobile station and a method for allocating a finger thereof in CDMA communication system.

BACKGROUND OF THE INVENTION

In recent years, attention has been given to CDMA communication system that is potent against interference and jamming as a communication system used for mobile communication system.

CDMA communication system is the one wherein user signals, which are desired to transmit, are spread with spreading codes to transmit the user signals on a transmitting side, while inverse spreading is made by the use of the same spreading codes as that described above on its receiving side thereby to acquire the original user signals.

Furthermore, in CDMA communication system, multipath components due to phasing and the like are synthesized, whereby reliability in data is improved.

In the following, a constitution of a mobile station in CDMA communication system will be described.

Data is transmitted from a base station to a mobile station. In this occasion, however, there is a case where a plurality of paths exists depending upon an environment of the mobile station. For instance, where there are obstacles such as buildings, trees and the like in an environment of the mobile station, radio waves

are reflected by these obstacles to present the plurality of paths.

FIG.1 shows an example of a constitution of a mobile station in a conventional CDMA communication system wherein three paths (radio waves A, B, and C) reside in between a base station 20 and the mobile station 30.

As shown in FIG.1, the mobile station 30 in the present constitutional example is composed of an antenna 1, an RF section 2, an AD section 3, a delay profile section 4, a finger allocating section 8, a plurality of finger sections 9, and a rake synthesizing section 7.

The antenna 1 receives a synthesized wave composed of a plurality of radio waves (radio waves A, B, and C) being arrived from the base station 20 through the plurality of paths. The RF section 2 converts the synthesized wave received by the antenna 1 into analog base band signals. The AD section 3 converts the analog base band signals converted in the RF section 2 into digital base band signals.

The delay profile section 4 acquires data transmitted from the base station 20 by spreading inversely with the use of the digital base band signals converted in the AD section 3. In this case, a delay profile is prepared by adding cumulatively the data acquired in a certain time interval for retrieving multipath components. In the case where multipath components exist, a plurality of peaks of the radio waves (radio waves A, B, and C) can be detected in a delay profile as shown in FIG.2.

The finger allocating section 8 allocates path timings (reference timings) corresponding to positions of the respective peaks in the plurality of the radio waves detected in the delay

profile section 4 to a separate finger sections 9, respectively.

Each of the finger sections 9 spreads inversely the digital base band signals converted by the AD section 3 at the respective path timings allocated by the finger allocating section 8, whereby data transmitted from the base station 20 is regenerated. The rake synthesizing section 7 synthesizes the data regenerated in the respective finger sections 9 to output demodulated data.

In the following, operation for path detection in the delay profile section 4 will be described.

The delay profile section 4 adds cumulatively data transmitted from the base station 20 for a certain period of time to prepare a delay profile. Such cumulative addition is implemented for the sake of discriminating a plurality of peaks in radio waves from noises, and in this respect, the longer period of time for cumulative addition can improve the better reliability in peak points.

However, too long period of time for cumulative addition brings about a possibility of displacement in peak points due to out of alignment in reference timing in between the base station 20 and the mobile station 30, influence of clock jitter inside the mobile station 30 or the like as shown in FIG.3.

Accordingly, each of the finger sections 9 tracks a path at a shorter cycle than a period of time for cumulative addition in the delay profile section 4 in order to follow positional changes (displacement) in peak points of the path.

In the following, path tracking operation in each of the finger sections 9 will be described by referring to FIG.4.

FIG.4 is a block diagram showing an example of a constitution